	Application No.	Applicant(s)
Notice of Allowability	10/604,492	LIU ET AL.
	Examiner	Art Unit	
	Victor J. Taylor	2863	.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *25 July 2003*.

2. ☒ The allowed claim(s) is/are *1-24*.

3. ☒ The drawings filed on *25 July 2003* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of

    Paper No./Mail Date _____ .

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date <u>8</u>

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☐ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

DETAILED ACTION

Drawings

1.   The drawings were received on 25 July 2003. These drawings are approved.

Prior Art

2.   The prior art made of record and not relied upon is considered pertinent to

applicant.

I. Art A of Strack et al., US 5,883,515 in class 324/339 is cited for the method of

determining formation resistivity using measurements of inductive and galvanic logging

to determine selective parameters surrounding a borehole 48 in figure 1 in a first volume

having known first radial and vertical dimensions rt in figure 5 with computation steps for

combining the inductive and galvanic measurements using the inversion technique to

obtain a measurement of the selected resistivity parameters of the earth formation

representative of the common volume of the formation 270 in figure 25 and teaches

using ground loop current and electric current flow in the borehole and computation

computer processes on the surface to produce a resistive measurement in lines 5-35 of

column 5. He further teaches a modeling technique using the matrix of partial

derivatives in lines 1-50 of column 12.

II. Art B of Neff et al., US 5,835,883 in class 702/007 is cited for the method for

determining the distribution of reservoir permeability and porosity and pseudo relative

permeability using computer computations and the petrophysical model 82 with steps

for partitioning the NUI data into reservoir volume simulation cells 98 in figure 9. He

teaches using slices containing a number of model data points and calculates average

values plotted versus depth for each sub volume compared with trend curves to provide

layering in the reservoir with matches selected for the sub volume. He teaches the

formation petrophysical property parameters pertinent to the desired result and teaches

forward modeling computer processes in lines 45-55 of column 10.

Allowable Subject Matter

3.   Claims 1-24 are allowed.

4.   The following is an examiner's statement of reasons for allowance:

        I. The method in claim 1 for determining a subsurface formation property with

computer computations for forming a volume model with method step limitations for

"determining a volume fraction of a layer in a multi electrical layer model for an

anisotropic region of the formation wherein the multi electrical layer model includes a

relative lower resistivity layer and a relative higher resistivity layer and the determining

is based on the resistivity measurement"...[and] with steps of "determining a resistivity

for the relative lower resistivity layer and determining a resistivity for the relative higher

resistivity layer based on the volume fraction and the bulk resistivity measurements of

the anisotropic region wherein the bulk resistivity measurements include a horizontal

resistivity or a vertical resistivity measurement"...[and/or] in combination with the

particularly claimed steps wherein "the determining the formation property is based on

the volume fraction and the resistivity of the relative lower resistivity layer and the

resistivity of the relative higher resistivity layer and a porosity measurement of the

anisotropic region and the bulk resistivity measurements" to produce the determination

of the formation resistivity and determine the hydrocarbon saturation is not found in the

cited art of record.

The prior Art A of Strack et al., teaches the method of determining formation

resistivity using the measurements of inductive and galvanic logging to determine the

selective parameters surrounding a borehole 48 in figure 1 in a first volume having

known first radial and vertical dimensions rt in figure 5. He teaches the use of

computation steps for combining the inductive and galvanic measurements by using the

inversion technique to obtain a measurement of the selected resistivity parameters of

the earth formation that are representative of the common volume of the formation 270

in figure 25. He further teaches using the ground loop current and the electric current

flow in the borehole with computation computer processes on the surface to produce a

resistive measurement in lines 5-35 of column 5. He further teaches a modeling

technique for using the matrix of partial derivatives in lines 1-50 of column 12.

The prior Art B of Neff et al., teaches the method for determining the distribution

of the reservoir permeability and the porosity and the pseudo relative permeability using

computer computations and the petrophysical model 82 in figure 9. He teaches

modeling method steps for partitioning the NUI data into the reservoir volume simulation

cells 98 in figure 9. He further teaches using data slices containing a number of model

data points and calculates the average values plotted versus the depth for each sub

volume and teaches steps to compare the trend curves to provide the layering in the

reservoir with data matches selected for the sub volume. He further teaches the

formation petrophysical property parameters that are pertinent to determine the desired

result and further teaches the forward modeling computer processes in lines 45-55 of column 10.

Therefore, the prior art Strack et al., and The prior art of Neff et al., in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 2-12 are dependent on the allowed independent claim 1 and are allowed at least for the reasons cited above.

II. The computer system in claim 13 adapted to process a program medium including instructions that when executed cause the computer system to process computer steps for "determining a volume fraction of a layer in a multi electrical layer model for an anisotropic region of the formation wherein the multi electrical layer model includes a relative lower resistivity layer and a relative higher resistivity layer and the determining is based on the resistivity measurement"...[and] with program steps for "determining a resistivity for the relative lower resistivity layer and determining a resistivity for the relative higher resistivity layer based on the volume fraction and the bulk resistivity measurements of the anisotropic region wherein the bulk resistivity measurements include a horizontal resistivity or a vertical resistivity measurement"...[and/or] in combination with the particularly claimed computer program steps wherein "the determining the formation property is based on the volume fraction and the resistivity of the relative lower resistivity layer and the resistivity of the relative

higher resistivity layer and a porosity measurement of the anisotropic region and the

bulk resistivity measurements" to produce the determination of the formation resistivity

and determine the hydrocarbon saturation is not found in the cited art of record.

The prior Art A of Strack et al., teaches the method of determining formation

resistivity using the measurements of inductive and galvanic logging to determine the

selective parameters surrounding a borehole 48 in figure 1 in a first volume having

known first radial and vertical dimensions rt in figure 5. He teaches the use of

computation steps for combining the inductive and galvanic measurements by using the

inversion technique to obtain a measurement of the selected resistivity parameters of

the earth formation that are representative of the common volume of the formation 270

in figure 25. He further teaches using the ground loop current and the electric current

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resistive measurement in lines 5-35 of column 5. He further teaches a modeling

technique for using the matrix of partial derivatives in lines 1-50 of column 12.

The prior Art B of Neff et al., teaches the method for determining the distribution

of the reservoir permeability and the porosity and the pseudo relative permeability using

computer computations and the petrophysical model 82 in figure 9. He teaches

modeling method steps for partitioning the NUI data into the reservoir volume simulation

cells 98 in figure 9. He further teaches using data slices containing a number of model

data points and calculates the average values plotted versus the depth for each sub

volume and teaches steps to compare the trend curves to provide the layering in the

reservoir with data matches selected for the sub volume. He further teaches the

formation petrophysical property parameters that are pertinent to determine the desired

result and further teaches the forward modeling computer processes in lines 45-55 of

column 10.

Therefore, the prior art Strack et al., and The prior art of Neff et al., in

combination or alone does not teach the present limitation of the claimed combination

limitation.

It is these limitations expressed in each of these claims and not found, taught, or

suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 14-24 are dependent on the allowed independent claim 13 and are

allowed at least for the reasons cited above.

Any comments considered necessary by applicant must be submitted no later

than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on

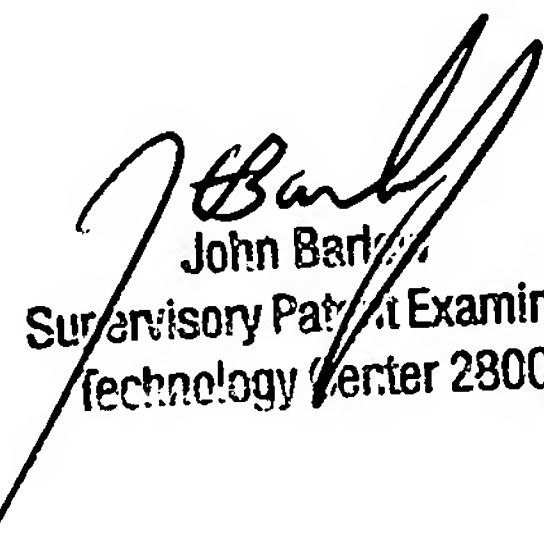Statement of Reasons for Allowance."

Conclusion

5.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Victor J. Taylor whose telephone number is 517-272-

2281. The examiner can normally be reached on 8:00 to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, John E. Barlow can be reached on 571-272-2863. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

VJT

March 27, 2005

John Barlow
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